stars than the remaining parts of the sky—a theory upon which some doubt had been cast by earlier work of this nature. The method, although of extreme simplicity, has certainly proved efficient for the first of these objects, and various systematic errors of scale have been clearly exhibited. With regard to the second object, an examination of the ratio of the number of faint stars to bright in the various regions investigated appeared at first to negative Prof. Kapteyn's conclusion; but, although this ratio was not found to vary with galactic latitude, certain changes were detected in different parts of the sky. Prof. Turner has thus been led to the interesting conclusion that regions of "obscuration" exist which tend to obliterate the fainter stars, and these regions appear to form a spiral in the heavens, the central line of which is approximately given by the equation

$$\alpha + 3{\cdot}66\delta = 247^\circ,$$

where α denotes right ascension and δ declination. There appears to be a fairly sharp boundary to this "spiral of obscuration" on the side of smaller R.A. in the northern hemisphere, and on the side of greater R.A. in the southern hemisphere.

Another very valuable piece of work is represented by a series of papers on "Baxendell's Observations of Variable Stars," edited by Prof. Turner and Miss M. A. Blagg. A very considerable amount of painstaking work must have been expended on this task of revising and editing Baxendell's observations of some twenty-three long-period variables. The greater part of the work appears to have been done by Miss Blagg, and the result as a whole is certainly a most valuable contribution to the study of this particular branch of astronomy. In connection with this subject we may also mention two papers by Prof. Turner "On the Classification of Long-period Variables," in which the alternative classifications of the author and of the Rev. T. E. R. Phillips are discussed and compared at some length. Both methods are considered to be useful, and a suggestion is made that some stars might pass from one of Phillips's groups to the other during the course of their evolution. This latter idea is more fully discussed in the particular case of W Cygni, which appears to be changing from Phillips's Group I. to Group II.

There are many other shorter papers of considerable interest, but these are too numerous to be noted here individually. The whole collection pays ample tribute to the energy and resource with which work has been carried out at the observatory during the trying period of the last few years. Apart from the many difficulties directly resulting from the war, there have been other troubles with which the staff has had to contend. In particular, we regret to note the decease of the caretaker, Mr. J. Mullis, who had been with the observatory since its erection in 1874. There is at present no second assistant or resident computer, and Prof. Turner and his staff must certainly be congratulated on the way in which the work has been carried on in the face of these and numerous other difficulties.

D. L. E.

The Alligator Pear.

THE cultivation of the Avocado or alligator pear is the subject of articles by Mr. W. G. Freeman and others in the Bulletin of the Department of Agriculture, Trinidad and Tobago (vol. xviii., part 3). The Avocado (*Persea gratissima*), a member of the family Lauraceæ, is a pear-shaped fruit with a large central stone, the amount of covering flesh varying considerably according as the kind is good or poor. It is one of the most important of the fruits which have become widely distributed since the discovery of the New World. It is probably a native of tropical America, and was introduced at an early date into the West Indies, where it is now naturalised. Sir Hans Sloane, in his "History of Jamaica" (1707–25), gives a long description of the tree and its fruit, and Dr. Patrick Browne (1756) is eloquent on the flavour of the latter and the esteem in which it is held. The edible portion of the fruit varies from a little under one-half to more than three-quarters of the weight of the whole, according to the thickness of the rind and the relative size of the seed. Its food-value is mainly due to its high fat content, which in some varieties approaches that of the olive, and is especially high in the fruit grown in Florida and California.

Although so long cultivated in the West Indies, yet little attention has been given until recently to the selection and propagation of good varieties. It is an extremely variable plant, and the method of selecting seeds from trees bearing the best fruit and of high productiveness gives uncertain results, as the varieties do not come true from seed. But by budding or grafting from good varieties these may be fixed, and by this means poor trees will be converted into good varieties. Mr. Freeman suggests the probability of a seedless Avocado being obtained, as occasional seedless fruits have been reported from the United States and Honolulu. The Avocado needs no very special care in cultivation, and does very well on the poor soil of parts of the northern range in Trinidad. Budding has been practised at the St. Clair Experiment Station for the last four years, and the curator, Mr. R. O. Williams, gives details of the operation. The method is the same as that generally adopted for roses and citrus. The full-grown tree is fairly free from insect pests, but the plant is more susceptible in early stages and when recently budded. Mr. F. W. Urich describes the various insect pests and means for combating them. A more serious disease which attacks the fruit is the so-called anthracnose, very closely related to the fungus which causes anthracnose of the mango. In the case of fruits packed for export this disease causes complete rotting of the whole consignment. Repeated sprayings with Bordeaux mixture are necessary to prevent its development.

The Improvement of Grassland.[1]

IT is too often the case that grassland is left to take care of itself, and that no steps are taken for its improvement. Even where manuring is carried out it is usually confined to occasional dressings of farmyard manure; little or no use is made of artificial fertilisers, and the beneficial effects of lime upon the herbage are far less widely known than they should be. The consequence is that much of the finest pasture and meadow land in the country is carrying only a second- or third-rate herbage simply from lack of knowledge of the most effective treatments to bring about improvement. For the education of public opinion in this respect nothing is more useful than demonstration plots, and the Ministry of Agriculture and Fisheries has issued a most valuable and comprehensive pamphlet outlining schemes of experiments suitable for this purpose. The schemes intended for farmers are simple in character and direct and practical in their object, while those drawn up for the agricultural colleges and institutes deal with experiments requiring considerable attention and supervision.

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[1] "The Improvement of Grassland: Suggestions for Demonstrations and Experiments." Miscellaneous Publications No. 25. Ministry of Agriculture and Fisheries.

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As a preliminary, the necessary tables are given to enable the manures used to be standardised to ensure uniformity of treatment so far as possible, and the method of noting and reporting the results is clearly outlined. It is recommended that the attention of farmers should be devoted to the improvement of the various classes of grassland on different types of soil, and particulars are given for the manuring of meadow hay, "seeds" or rotation hay, and pastures of different grades. Emphasis is laid on the value of liming experiments, which should be carried on at the same time as the manurial tests.

The attention of agricultural colleges and institutes is directed to the need for various experiments other than manurial trials. Grazing trials properly carried out would provide valuable information as to the best methods of dealing with pasture land, and mechanical operations are suggested to show the effect of mole-draining, cultivation, breaking, and reseeding. In addition, it is suggested that a good deal of attention might profitably be directed to a consideration of the seeds used for sowing down, with regard to the permanence of different varieties, the most suitable mixtures for leys and for renovating permanent grass, and to the possibility of harvesting supplies of seed.

The pamphlet is so suggestive and so broad in its scope that it should find its way into the hands of all interested in grassland, and it is much to be hoped that the official nature of the publication will not prevent it from reaching the general farming public.

W. E. BRENCHLEY.

Levelling Errors.[1]

A DEPARTMENTAL paper lately published by the Survey of Egypt contains an interesting investigation of a systematic error which has been found to occur in the levelling carried out in Egypt and in the Sudan. The effect of this error, which has the same sign over all kinds of ground, acts in the direction of making the backstaff reading systematically too small and the forestaff reading too great. Movement of the staves or level and other sources of error having been eliminated, the author draws the conclusion that the effect of refraction is not wholly removed by keeping the distances between the level and the staves equal in the conditions under which the work is done. Precise levelling in Egypt is carried out in the winter months and during about three hours after sunrise and three hours before sunset. Experiments have shown that at sunrise a temperature lapse-rate of the order of 1° C. to 2° C. per metre often exists, the air being colder near the ground than higher up. In two or three hours this lapse-rate has disappeared, and a little later becomes reversed, so that with hotter air near the ground setting up convection currents, unsteadiness of the staff-image sets in, preventing further work. In the afternoon the ground cools very slowly, so that the change in the temperature lapse-rate, and consequently in the refraction, is then very gradual.

The error is, therefore, traced to the very rapid change in refraction during the early morning hours, of which the effect is noticeable in observations taken at a few minutes' interval. To eliminate it, all staff readings are now taken with as little delay as possible, and the observer reads alternately the backstaff first and the forestaff first—a procedure which has very materially reduced the systematic error, not only in precise levelling, but to a much greater degree in second-order levelling, where the time taken between successive readings is much longer.

It has been recognised for some time that a systematic error may be caused by such a temperature inversion when levelling over sloping ground, but in the present report the rapid change of the temperature lapse-rate from a maximum value to zero is indicated as a cause which may be expected to operate even on level ground in any region where hot days follow clear, cold nights with effective radiation. In the last annual report of the Ordnance Survey such a systematic error, almost invariably of one sign, is referred to as being still unexplained. It would seem that here also local temperature inversions near the ground may be concerned to some extent.

H. G. L.

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[1] "Systematic Error in Spirit Levelling." By J. H. Cole. Survey of Egypt Departmental Paper No. 35. (Cairo, 1919.)

University and Educational Intelligence.

BIRMINGHAM.—Sir John Cadman is resigning his post as professor of mining at the end of the current session.

CAMBRIDGE.—On May 19 the degree of Doctor of Law *honoris causa* was conferred upon Lord Plymouth, Admiral of the Fleet Lord Jellicoe, Field-Marshal Lord Haig, Rear-Admiral Sir W. R. Hall, M.P., the Abbé Henri Breuil, Institute of Human Palæontology, Paris, and Sir John Sandys, Orator Emeritus.

LEEDS.—At a meeting of the University Council held on May 19, it was resolved that a chair of physical chemistry should be instituted, and Dr. H. M. Dawson was selected to be the first occupant of the chair. Since 1905 Dr. Dawson has been lecturer in physical chemistry at the University, and has carried out extensive researches in various branches of physical chemistry—in particular, investigations bearing on the constitution of solutions and on the mechanism of chemical change.

LONDON.—The degree of D.Sc. (Engineering) has been conferred on Mr. B. C. Laws, an external student, for a thesis entitled "Elasticity and Distribution of Stress in Thin Steel Plates," and other papers.

From the report of the Principal Officer (Sir Cooper Perry) for 1919–20, it appears that the University can look forward to a period of unprecedented development. Admissions by all channels in 1919–20 amounted to 12,608, almost double the corresponding number for 1913–14. Candidates for first degrees were 936, comparing with 1636, reflecting the diminished numbers of those who matriculated "during the lean—the honourably lean—years of the war." It is of interest to note that of the 1086 candidates for all degrees, 613 were internal and 473 external. This is gratifying evidence that the "private" student is tending to disappear, or, rather, to study under more favourable conditions. The list of benefactions to the University and its colleges is most encouraging. The outstanding gift is from the trustees of the Sir Ernest Cassel Educational Trust of 150,000*l.*, and 4000*l.* a year for five years. New University chairs have been established in aeronautics, modern Greek, Portuguese, Imperial history, Dutch, bacteriology, physiology, pathology, and physics. The question of hostel accommodation is being considered by a special committee. The report concludes on "a justified note of congratulation." The duty of the universities is plain; their province, though extensive and varied, is defined; their way is illuminated; "into the universities the nation looks in a unique degree for hearts and minds fitted to enrich the blood of the race—for the constant supply of men and women of trained insight and enlarged sympathies, apt for the higher offices of citizenship. This is our peculiar duty—to

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